Middle Eel River

Watershed Management Plan

SECTION 5

CRITICAL AREAS

1/19/11

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5.0 CRITICAL AREAS

High and secondary priority critical areas are considered essential areas for implementation of practices to improve or protect water quality, biotic community and/or habitat. Water monitoring indicates that all the subwatersheds within the Middle Eel River Watershed are impaired and could be considered critical areas. However, it is important to prioritize the subwatersheds to determine the most effective strategy for water quality improvement. To that end the Steering Committee determined critical areas in two categories; high priority and secondary priority. The critical area and priority designations will be used in the ranking process for the cost-share program and implementation.

The critical area ranking of testing tributaries was accomplished by creating a holistic scoring system for water quality impairments that includes the chemical, biological and physical analysis of each testing tributary. A point system was developed to rank testing tributaries within the watershed using the following criteria:

Chemical Analysis:
Highest annual mean for parameter of concern: 5 Points
Second highest annual mean – 4 Points
Third highest annual mean – 3 Points

Biological Analysis:
IBI (As opposed to the chemical analysis, a high IBI score is good)
Lowest IBI – 5 Points
Second lowest IBI – 4 Points
Third lowest IBI – 3 Points

Physical Analysis:
QHEI (As opposed to the chemical analysis, a high QHEI score is good)
Lowest QHEI – 5 Points
Second lowest QHEI – 4 Points
Third lowest QHEI - 3 Points

This is a relative ranking process and only ranks the testing tributaries in comparison to each other and does not indicate the overall stream health

The critical area ranking results for each testing tributary in the watershed are shown in Tables 5-1 through 5-3.

Table 5-1. Middle Eel River Watershed point ranking results of Testing Tributaries – 2009.

Testing Tributary	QHEI Ranking	IBI Ranking	E. coli Ranking	Nitrate Ranking	Ammonia Ranking	Total Phosphorus Ranking	TSS Ranking	2009 TOTAL Score
Silver Creek	4	5	4	0	0	0	4	17
Beargrass Creek	0	4	0	5	0	5	5	19
Squirrel Creek	3	0	5	0	3	0	0	11
Paw Paw Creek	0	0	0	4	0	0	0	4
Flowers Creek	0	0	3	3	4	4	3	17
Little Weesau-Weesau Creek	5	5	0	0	5	3	0	18

Table 5-2. Middle Eel River Watershed point ranking results of Testing Tributaries – 2010.

Testing Tributary	QHEI Ranking	IBI Ranking	E. coli Ranking	Nitrate Ranking	Ammonia Ranking	Total Phosphorus Ranking	TSS Ranking	2010 TOTAL Score
Silver Creek	4	4	4	0	5	3	5	25
Beargrass Creek	0	3	0	4	0	5	0	12
Squirrel Creek	0	0	5	0	4	0	4	13
Paw Paw Creek	0	0	0	5	3	4	0	12
Flowers Creek	3	0	0	3	0	0	0	6
Little Weesau-Weesau Creek	5	5	3	0	0	0	3	16

Table 5-3. Middle Eel River Watershed point ranking results of Testing Tributaries – total combined scores 2009 and 2010.

Testing Tributary	QHEI Ranking	IBI Ranking	E. coli Ranking	Nitrate Ranking	Ammonia Ranking	Total Phosphorus Ranking	TSS Ranking	2009 and 2010 Combined TOTAL Score
Silver Creek	8	9	8	0	5	3	9	42
Beargrass Creek	0	7	0	9	0	10	5	31
Squirrel Creek	3	0	10	0	7	0	4	24
Paw Paw Creek	0	0	0	9	3	4	0	16
Flowers Creek	3	0	3	6	4	4	3	23
Little Weesau-Weesau Creek	10	10	3	0	5	3	3	34

Using this methodology, the highest priority critical areas are those that scored the highest number of points relative to each other. Using this ranking criteria, the high priority critical areas in the Middle Eel River Watershed are Silver Creek (HUC - 051201040501), Beargrass Creek (HUC - 051201040503), and Little Weesau-Weesau Creek (HUC – 051201040602) (Figure 5-1). Table 5-4 shows the parameters of concern for each high priority critical subwatershed in the Middle Eel River Watershed.

The secondary priority critical areas chosen by the Steering Committee have somewhat lower combined impairments and are: Flowers Creek (HUC - 051201040601), Oren Ditch-Paw Paw Creek (HUC - 051201040508), Otter Creek (HUC-051201040502), Squirrel Creek (HUC - 051201040505), Town of Roann (HUC – 051201040509), and Washonis Creek (HUC – 051201040603) (Figure 5-1). Table 5-5 shows the parameters of concern for each secondary priority critical subwatershed in the Middle Eel River Watershed. The secondary critical subwatersheds of Otter Creek (HUC-051201040502), Town of Roann (HUC – 051201040509), and Washonis Creek (HUC – 051201040603) were included due to their listing on IDEMs 303(d) Listing.

Figures 5-2 through 5-7 provide the water monitoring results for each parameter of concern for each testing tributary for 2009 and 2010 and demonstrate the impairments throughout the Middle Eel River Watershed in all the testing tributaries.

Table 5-4. Middle Eel River Watershed – Critical Area - High Priority Subwatersheds with parameters of concern.

Middle Eel River High Priority Critical Areas		
12 Digit HUC	**HUC Name**	**Parameter of Concern**
051201040501	Silver Creek	IDEM 303(d) List for high phosphorus and *E. coli*, and PCBs in Fish Tissue ***Low*** - IBI & QHEI ***High*** - *E. coli*, Ammonia, TSS, and total phosphorus
051201040503	Beargrass Creek	IDEM 303(d) List for high *E. coli* ***Low*** – IBI ***High*** - *E. coli*, TSS, nitrates and total phosphorus
051201040602	Little Weesau – Weesau Creek	***Low*** - IBI & QHEI ***High*** - *E. coli*, ammonia, nitrates and total phosphorus

Table 5-5. Middle Eel River Watershed – Critical Area - Secondary Priority Subwatersheds with parameters of concern.

Middle Eel River Secondary Priority Critical Areas		
12 Digit HUC	**HUC Name**	**Cause for Listing**
051201040601	Flowers Creek	IDEM 303 (d) List for low DO, impaired biotic community, nutrients, mercury and PCBs, ***High*** - *E. coli*, TSS, nitrates and total phosphorus
051201040502	Otter Creek	IDEM 303 (d) List for *E. coli* and PCBs ***High*** - *E. coli*, TSS and total phosphorus
051201040508	Oren Ditch – Paw Paw	IDEM 303 (d) List for *E. coli* ***High*** - *E. coli*, TSS and total phosphorus
051201040505	Squirrel Creek	IDEM 303 (d) List for *E. coli* ***High*** - *E. coli*, TSS, nitrates and total phosphorus
051201040509	Town of Roann	IDEM 303 (d) List for *E. coli* and PCBs ***High*** - *E. coli*, TSS and total phosphorus
051201040603	Washonis Creek	IDEM 303 (d) List for *E. coli*, mercury and PCBs ***High*** - *E. coli*, TSS and total phosphorus

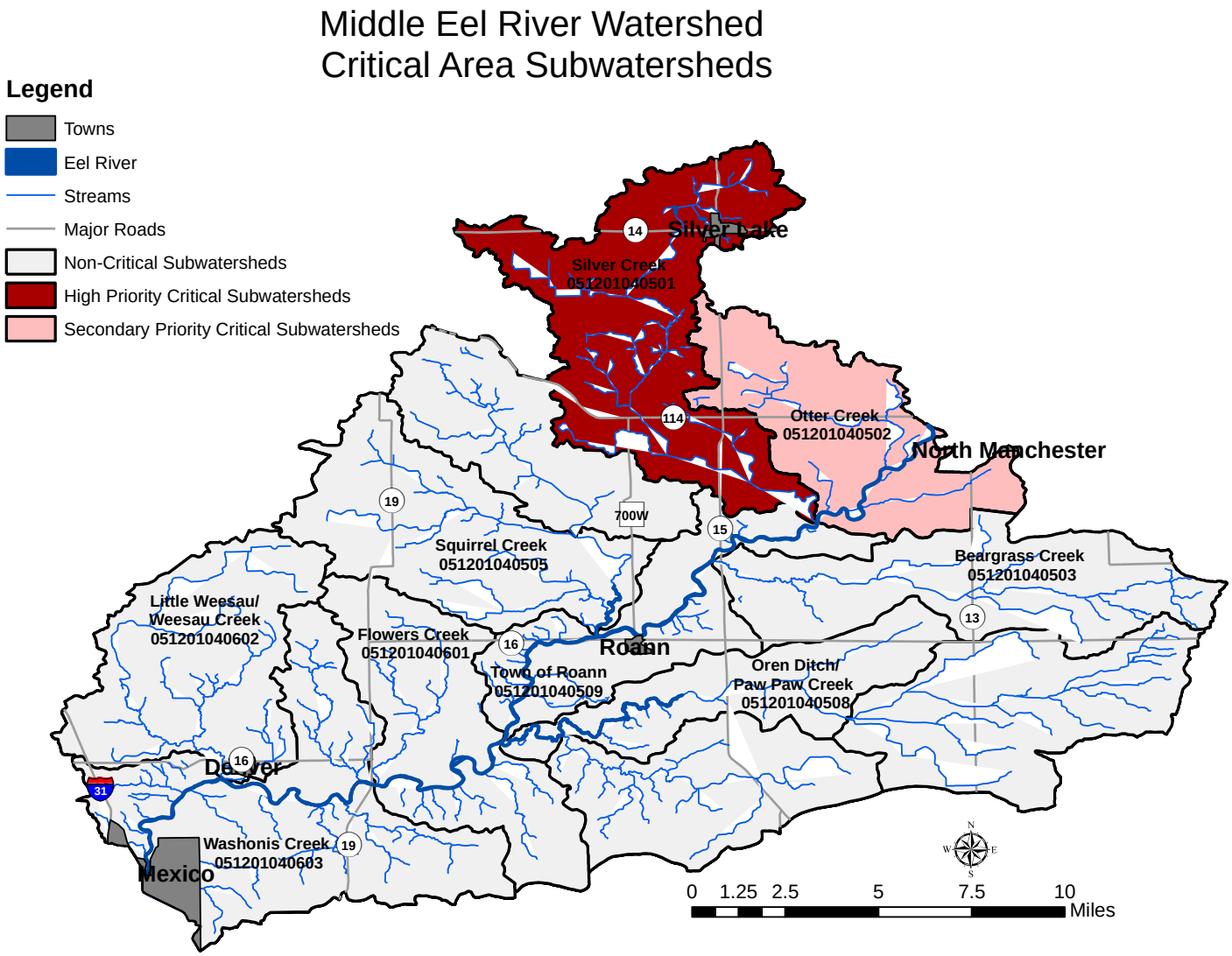


Figure 5-1. Middle Eel River Watershed, Critical Areas – High and Secondary Priority.

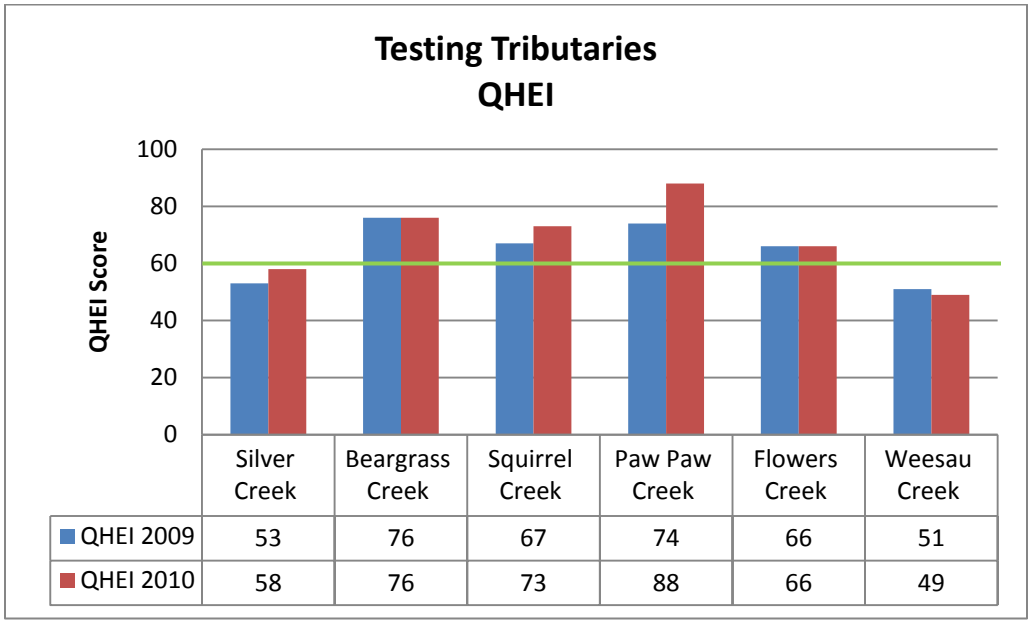


Figure 5-2. Middle Eel River Watershed - 2009 and 2010 QHEI scores for testing tributaries. The green line indicates a QHEI score of 60 which is the goal of this Watershed Management Plan.

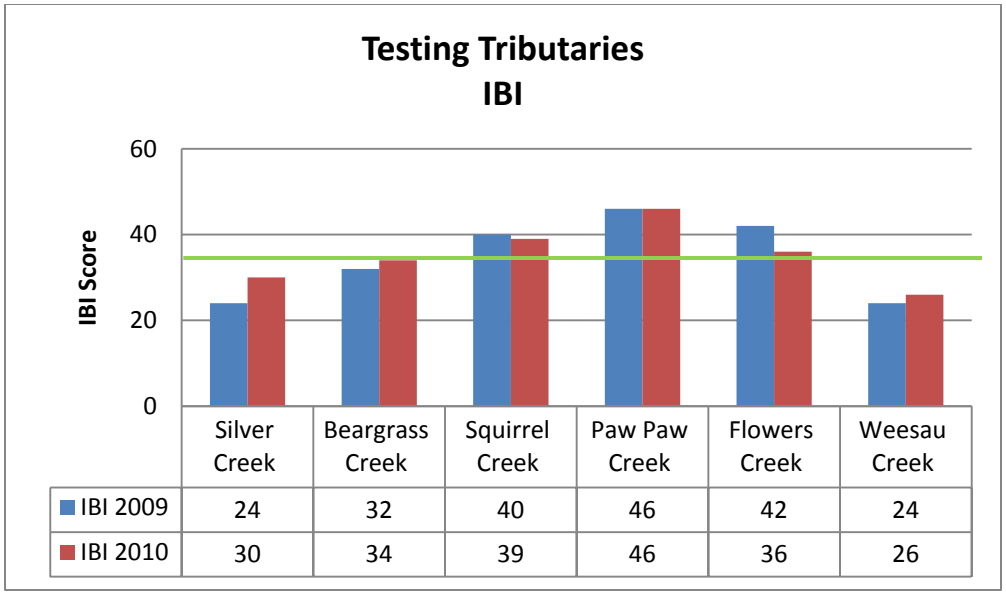


Figure 5-3. Middle Eel River Watershed - 2009 and 2010 IBI scores for testing tributaries. The green line indicates and IBI score of 35 which represents fair conditions within the tributary.

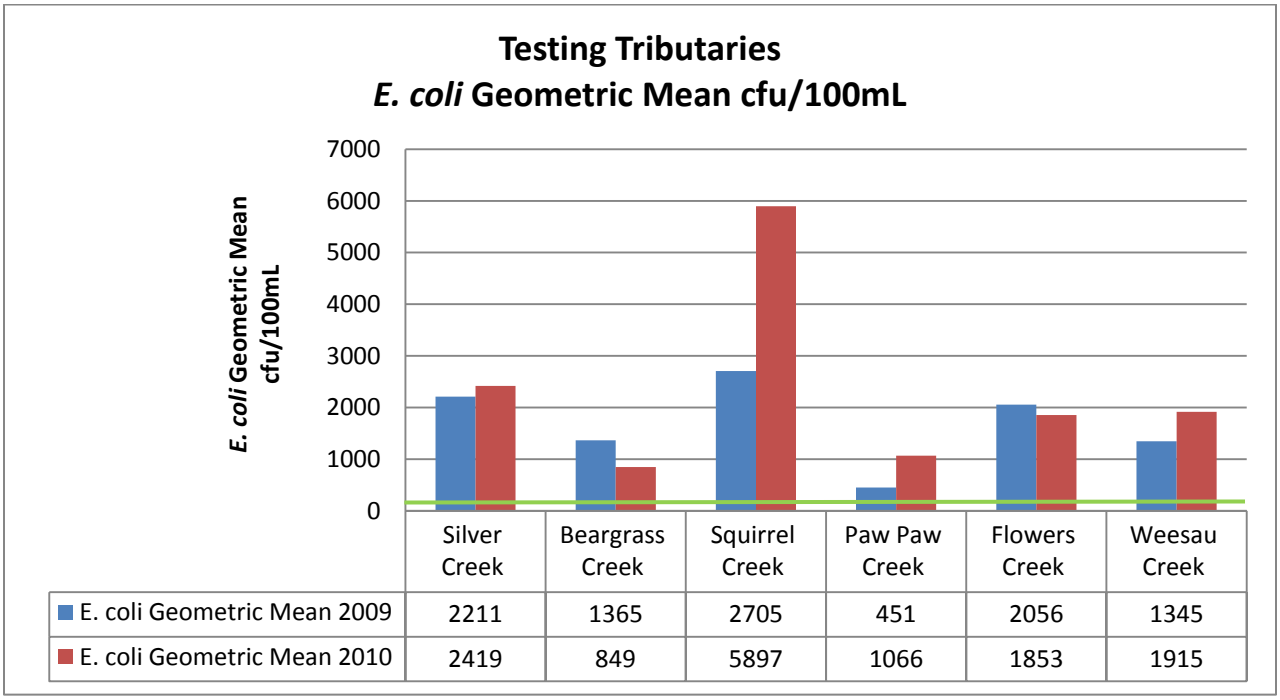


Figure 5-4. Middle Eel River Watershed - 2009 and 2010 *E. coli* geometric mean (cfu/100mL) water monitoring results for testing tributaries. The green line represents 125 cfu/100mL which is the Indiana State Standard and the target of this Watershed Management Plan.

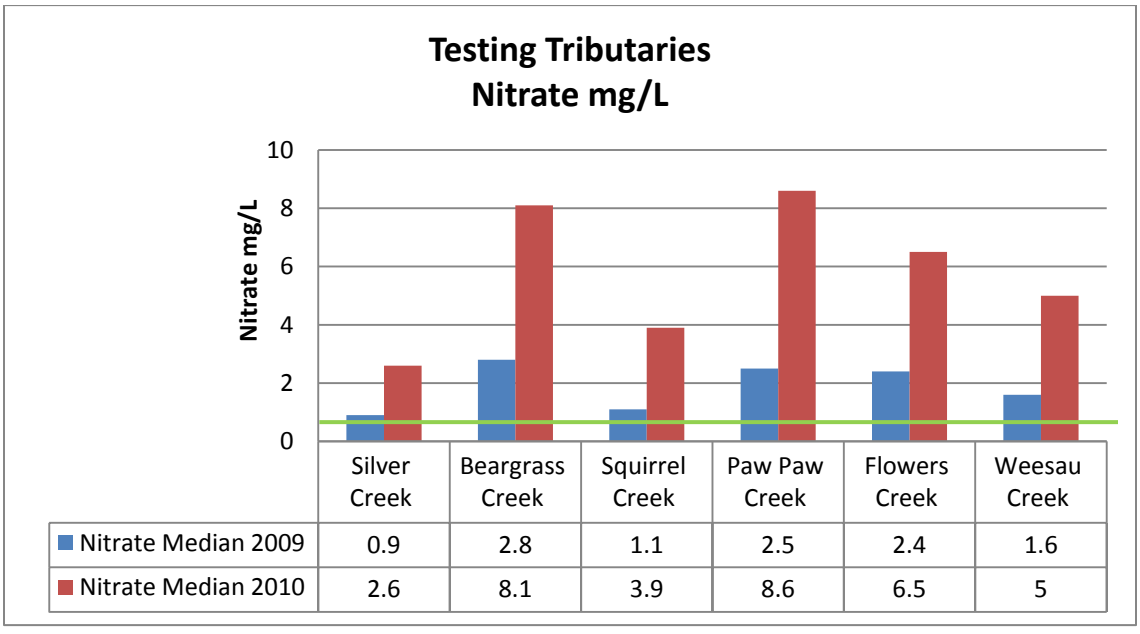
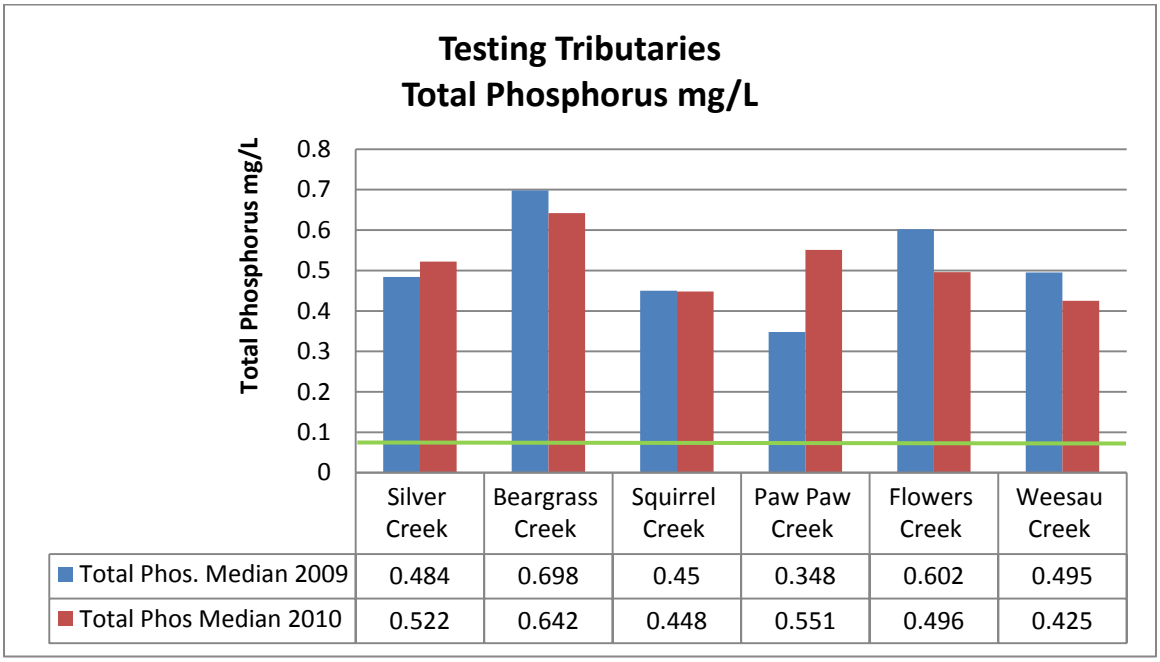
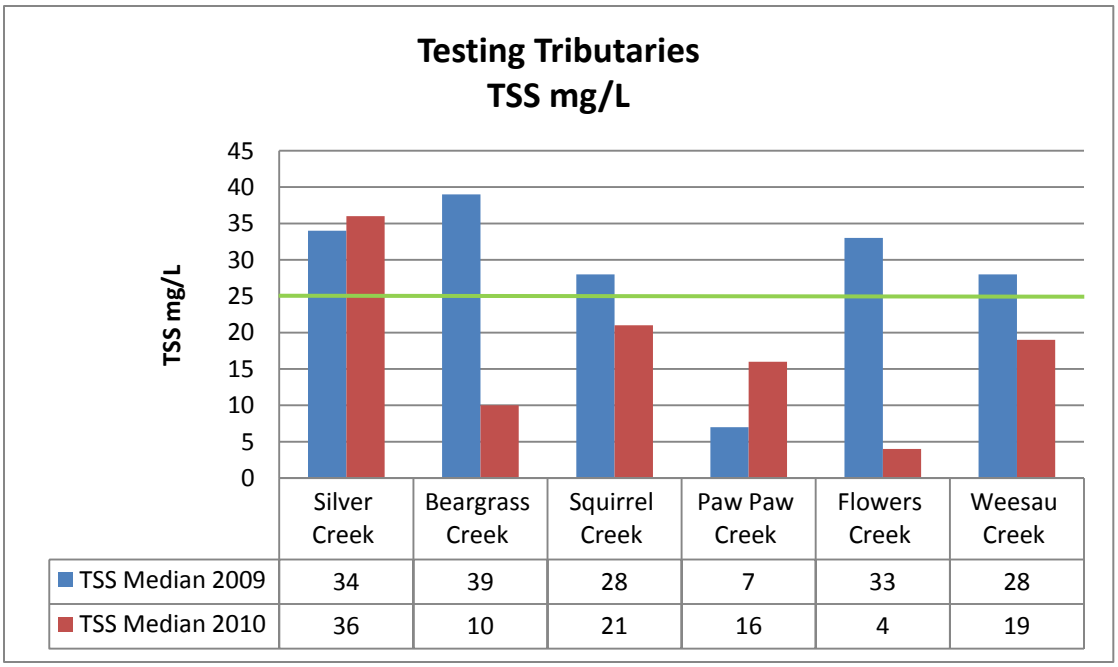


Figure 5-5. Middle Eel River Watershed - 2009 and 2010 Median Nitrate (mg/L) water monitoring results for testing tributaries. The green line represents the USEPA Recommendation of 0.633 mg/L which is the target of this Watershed Management Plan.



	Silver Creek	Beargrass Creek	Squirrel Creek	Paw Paw Creek	Flowers Creek	Weesau Creek
Total Phos. Median 2009	0.484	0.698	0.45	0.348	0.602	0.495
Total Phos Median 2010	0.522	0.642	0.448	0.551	0.496	0.425

Figure 5-6. Middle Eel River Watershed - 2009 and 2010 Median Total Phosphorus (mg/L) water monitoring results for testing tributaries. The green line represents the US EPA Recommendation of 0.076 mg/L which is the target of this Watershed Management Plan.



	Silver Creek	Beargrass Creek	Squirrel Creek	Paw Paw Creek	Flowers Creek	Weesau Creek
TSS Median 2009	34	39	28	7	33	28
TSS Median 2010	36	10	21	16	4	19

Figure 5-7. Middle Eel River Watershed - 2009 and 2010 Median TSS (mg/L) water monitoring results for testing tributaries. The green line represents 25 mg/L which is the target of this Watershed Management Plan.